that the first w/2 pixels in the row are printed in the same pass (a_i), and the last w/2 pixels in the row are printed in another pass (b_i), and wherein said diagnostic print mode mask includes a row wherein said first w/2 pixels are assigned to be printed in a first pass, and said last w/2 pixels are assigned to be printed in a last pass of said plurality of passes.

REMARKS

The Examiner is thanked for the careful review of the application as set out in the outstanding office action. Reconsideration of the application is respectfully requested.

A marked up version of the changes made to the application is attached hereto.

Objections to Claims 20-21

Claims 20-21 stand objected to as being identical to Claims 17 and 18, respectively. Applicants respectfully disagree. Claims 17 and 18 are drawn to a diagnostic method for visual detection of poor media calibration in an ink-jet printing system. Claims 20 and 21 are drawn to a multi-pass diagnostic print mode mask. The subject matter of Claims 17-18 is not identical to that of Claims 20-21.

Withdrawal of the objection is respectfully requested.

Allowable Subject Matter

Claims 4, 6, 9, 13, 18 and 21 stand as objected to as dependent upon a rejected base claim, but as allowable if rewritten in independent form including all limitations of the base claim and any intervening claim.

Claim 22 has been allowed.

The indication of allowable subject matter is appreciated. Claims 4, 6, 9, 13, 18 and 21 have amended for the sole purpose of placing them in independent form, and are believed to be in condition for allowance.

Claims Rejections - 35 USC 102 (Haselby et al.)

Claims 1, 2, 5, 10, 11 and 14 have been rejected as being "obvious" by Haselby et al. ("Haselby"). Applicants believe that, since the rejection is under Section 102, these claims are rejected as being anticipated by Haselby.

Claim 1 is drawn to a diagnostic method for visual detection of poor media advance calibration in an ink-jet printing system, comprising:

[A] printing different areas of a diagnostic pattern at different passes of one or more ink-jet printheads with a controlled amount of media advances between the passes, to accumulate media advance error between the printing of the different areas; and

[B] examining the diagnostic pattern to determine whether the accumulated media advance error is sufficiently objectionable to take corrective action.

Haselby does not disclose a diagnostic method as recited in Claim 1, and particularly does not disclose either [A] or [B], where [A], [B] have been added for convenience in reference. Haselby is directed to a media advance system for swath printers, wherein for the first swath of the page, marginal lines are drawn by the first and Nth print devices of the print head on the same swath. Without moving the media, the line sensor is positioned over the marginal line printed by the first device, and the resulting difference signal from the line sensor is saved as a reference value. The media is then advanced until the same value of the difference signal is obtained from the line image of the marginal line drawn by the Nth print device. The media is then advanced a predetermined amount to precisely position the media for the next successive swath to be printed, or the next swath is printed without using the first nozzle and without advancing the media from the position of the marginal line of the Nth print device. The next swath is then printed, with a marginal line printed by the Nth print device, and so on for the rest of the page. The marginal lines printed by the first and Nth print devices are therefore printed on the same, first swath on the page.

Claim 10 is drawn to a diagnostic method for visual detection of poor media advance calibration in an ink-jet printing system, comprising:

[A] providing an ink-jet printhead mounted on a carriage, the carriage mounted for movement along a scan axis;

[B] providing a media advance system for advancing a print medium along a media path which is transverse to the scan axis;

[C] entering a diagnostic multi-pass print mode;

[D] printing different areas of a diagnostic plot at different passes using said ink-jet printhead with a controlled amount of media advances between the passes to accumulate media advance error between the printing of the different areas; and

[E] examining the diagnostic plot to determine whether the accumulated media advance error is sufficiently objectionable to take corrective action.

Haselby does not disclose the limitations of [C], [D] or [E] of Claim 10, for reasons similar to those discussed above regarding Claim 1.

Because each element of the rejected claims is not described by Haselby, the rejection under Section 102 should be withdrawn.

Claims Rejections - 35 USC 102 (Maeda et al.)

Claims 19-20 stand rejected under 35 USC 102 based on Maeda et al. ("Maeda"). The rejection of Claim 19 is mooted by the cancellation without prejudice of this claim.

Claim 20 is amended to place the claim in independent form. Maeda does not describe a mask as described in this claim, which includes, for example, the limitation of the "diagnostic print mode mask defining that the first w/2 pixels in the row are printed in the same pass (a_i), and the last w/2 pixels in the row are printed in another pass (b_i)." In contrast, the pixels of FIG. 10C of Maeda on a given row are printed in alternating fashion, i.e. pass 1, pass 3, pass 1, pass 3 for the first row.

Because Maeda does not describe each element of Claim 19, the rejection should be withdrawn.

Claims Rejections - 35 USC 103

Claims 3, 7, 8, 12, 16 and 17 stand rejected as being unpatentable over Haselby in view of Maeda. This rejection is respectfully traversed on the ground that a prima facie case of obviousness has not been established, and the references do not teach or suggest the invention of these claims.

Haselby has been discussed above, and similar considerations apply to the claims under rejection based on Section 103.

Maeda discloses a multi-scanning printing method, using masking patterns to suppress color bleeding between adjacent pixels.

The Examiner asserts that it would have been obvious to include the applying of a diagnostic multi-pass print mode mask as designed by Maeda into the design of Haselby, because this reduces the formed bind pitch to less than paper transport width without increasing the number of scans, thus the banding artifacts are imperceptible as taught by Maeda at 4:4-10. Applicants respectfully disagree with this holding.

Even if the references are combined, the claimed invention is not obtained. Haselby is directed to a media advance system for swath printers, wherein for the first swath of the page, marginal lines are drawn by the first and Nth print devices of the print head on the same swath. These lines are used to subsequently advance the paper in a precise manner using the line sensor. Maeda describes a method of printing the data part of the swath, not a diagnostic plot. There is therefor no reason to combine the teachings of the two references, and even if the combination is made, the features of the rejected claims do not result.

Withdrawal of the rejection under Section 103 is respectfully requested.

CONCLUSION

The outstanding objections and rejections have been addressed, and the application is in condition for allowance. Such favorable reconsideration is solicited.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS

2. (Amended) The method of Claim 1, wherein said printing different areas comprises:

printing a first area comprising a first set of pixels printed during a first pass;

conducting a plurality of [incrementally] incremental media advances;

printing a further area comprising a second set of pixels printed during a further pass, wherein media advance errors resulting from said plurality of media advances are accumulated between printing said first area and printing said further area.

4. (Amended) [The method of Claim 1] A diagnostic method for visual detection of poor media advance calibration in an ink-jet printing system, comprising:

printing different areas of a diagnostic pattern at different passes of one or more ink-jet printheads with a controlled amount of media advances between the passes, to accumulate media advance error between the printing of the different areas; and

examining the diagnostic pattern to determine whether the accumulated media advance error is sufficiently objectionable to take corrective action, wherein said step of examining the diagnostic pattern is conducted visually by a user.

6. (Amended) [The method of Claim 1, further comprising an initial step of] A diagnostic method for visual detection of poor media advance calibration in an ink-jet printing system, comprising:

checking for printhead health and taking any corrective needed action [prior to printing said diagnostic pattern];

printing different areas of a diagnostic pattern at different passes of one or more ink-jet printheads with a controlled amount of media advances between the passes, to accumulate media advance error between the printing of the different areas; and

examining the diagnostic pattern to determine whether the accumulated media advance error is sufficiently objectionable to take corrective action.

9. (Amended) [The method of Claim 8] A diagnostic method for visual detection of poor media advance calibration in an ink-jet printing system, comprising:

printing different areas of a diagnostic pattern at different passes of one or more ink-jet printheads with a controlled amount of media advances between the passes, to accumulate media advance error between the printing of the different areas, said printing of a diagnostic pattern comprising applying a diagnostic multi-pass print mode mask, wherein a plurality of carriage passes are employed to print the area subtended by a printhead nozzle array, the diagnostic print mode mask comprising a rectilinear grid of pixels, with each pixel location having a number associated therewith, the number representing the pass in which the pixel will be printed, and wherein said different areas include a first set of pixels on a row of said grid, and a second set of pixels on said row, and wherein said first set of pixels is printed on a different pass than said second set of pixels is printed, said diagnostic print mode mask defines that the first w/2 pixels in the row are printed in the same pass (a_i), and the last w/2 pixels in the row are printed in another pass (b_i), wherein said diagnostic print mode mask includes a row wherein said first w/2 pixels are printed in a first pass, and said last w/2 pixels are printed in a last pass of said plurality of passes; and

examining the diagnostic pattern to determine whether the accumulated media advance error is sufficiently objectionable to take corrective action,.

13. (Amended) A diagnostic method for visual detection of poor media advance calibration in an ink-jet printing system, comprising:

providing an ink-jet printhead mounted on a carriage, the carriage mounted for movement along a scan axis;

providing a media advance system for advancing a print medium along a media path which is transverse to the scan axis;

entering a diagnostic multi-pass print mode;

printing different areas of a diagnostic plot at different passes using said ink-jet printhead with a controlled amount of media advances between the

passes to accumulate media advance error between the printing of the different areas; and

examining the diagnostic plot to determine whether the accumulated media advance error is sufficiently objectionable to take corrective action, [The method of Claim 10,] wherein said step of examining the diagnostic pattern is conducted visually by a user.

18. (Amended) [The method of Claim 17] A diagnostic method for visual detection of poor media advance calibration in an ink-jet printing system, comprising:

providing an ink-jet printhead mounted on a carriage, the carriage mounted for movement along a scan axis;

providing a media advance system for advancing a print medium along a media path which is transverse to the scan axis;

entering a diagnostic multi-pass print mode;

printing different areas of a diagnostic plot at different passes using said ink-jet printhead with a controlled amount of media advances between the passes to accumulate media advance error between the printing of the different areas, said printing different areas of a diagnostic plot comprising applying a diagnostic multi-pass print mode mask, wherein a plurality of carriage passes are employed to print the area subtended by a printhead nozzle array, the diagnostic print mode mask comprising a rectilinear grid of pixels, with each pixel location having a number associated therewith, the number representing the pass in which the pixel will be printed, and wherein said different areas include a first set of pixels on a row of said grid, and a second set of pixels on said row, and wherein said first set of pixels is printed on a different pass than said second set of pixels is printed, said diagnostic print mode mask defining that the first w/2 pixels in the row are printed in the same pass (a_i), and the last w/2 pixels in the row are printed in another pass (b_i), wherein said diagnostic print mode mask includes a row wherein said first w/2 pixels are printed in a first pass, and said last w/2 pixels are printed in a last pass of said plurality of passes; and

examining the diagnostic plot to determine whether the accumulated media advance error is sufficiently objectionable to take corrective action.

20. (Amended) [The mask of Claim 19] A multi-pass diagnostic print mode mask for visual detection of poor media advance calibration in an ink-jet printing system including a printhead having a nozzle array, wherein a plurality of carriage passes are employed to print the area subtended by a printhead nozzle array, the diagnostic print mode mask comprising a rectilinear grid of pixels, with each pixel location having a number associated therewith, the number representing the pass in which the pixel will be printed, and wherein said different areas include a first set of pixels on a row of said grid, and a second set of pixels on said row, and wherein said first set of pixels is printed on a different pass than said second set of pixels is printed, wherein said diagnostic print mode mask defining that the first w/2 pixels in the row are printed in the same pass (a_i), and the last w/2 pixels in the row are printed in another pass (b_i).

21. (Amended) [The mask of Claim 20,] A multi-pass diagnostic print mode mask for visual detection of poor media advance calibration in an ink-jet printing system including a printhead having a nozzle array, wherein a plurality of carriage passes are employed to print the area subtended by a printhead nozzle array, the diagnostic print mode mask comprising a rectilinear grid of pixels, with each pixel location having a number associated therewith, the number representing the pass in which the pixel will be printed, and wherein said different areas include a first set of pixels on a row of said grid, and a second set of pixels on said row, and wherein said first set of pixels is printed on a different pass than said second set of pixels is printed, said diagnostic print mode mask defining that the first w/2 pixels in the row are printed in the same pass (a_i), and the last w/2 pixels in the row are printed in another pass (b_i), and wherein said diagnostic print mode mask includes a row wherein said first w/2 pixels are assigned to be printed in a first pass, and said last w/2 pixels are assigned to be printed in a last pass of said plurality of passes.